

Title/Subject: Thermal Shock Test on Windows and Lenses		
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## 1.0 Purpose

This Standard Test Procedure is used by the Electrical Safety Division to determine if a glass or polycarbonate window or lens can withstand a thermal shock without defect or breakage.

## 2.0 Scope

This Standard Test Procedure encompasses explosion-proof enclosures submitted to MSHA for approval under 30 CFR, Part 18.

## 3.0 Reference

3.1 30 CFR Part 18.66(a)

3.2 Criteria for the Evaluation of a Window or Lens on an Explosion-Proof (X/P) Enclosure (ACRI2102).

## 4.0 Test Equipment

4.1 Oven

4.2 Data acquisition system (datalogger, or digital thermometer).

4.3 Thermocouples as required (thermocouple wire not to exceed 24 AWG).

4.4 Drum or tank of water. Drum or tank shall be of sufficient size and shape to physically accommodate the entire test sample while immersed. The volume of water shall be sufficient to cool the sample without raising the temperature of the water by more than 5 degrees C.

## 5.0 Test Samples

Four (4) samples of the lens to be tested. The test shall be conducted with the sample assembled in the frame or assembly in which used. No "equivalent thereof" samples or assemblies shall be used.

## 6.0 Test Procedure

- 6.1 Adjust the oven to a temperature of 115 degrees C (240 degrees F), for polycarbonate or 150 degree C (302 degree F) for glass lenses. If the oven does not use a precision-type temperature control, the temperature should be monitored using a thermocouple and digital thermometer or datalogger and manually fine-tuned until it stabilizes at the set point.
- 6.2 Adjust the water temperature to 15 degrees C (59 degrees F). The water temperature shall be monitored during each test with a thermocouple to assure that it does not exceed 20 degrees C (68 degrees F) when the sample is immersed.
- 6.3 Inspect the four (4) sample assemblies to be tested for any visual defects. Lenses having defects greater than as defined in ACRI2102 shall be rejected.
- 6.4 Place the samples in the oven and attach a thermocouple to one (1) of the samples at the point or surface expected to be the last to stabilize at oven temperature. This normally will be the thickest part or inner most surface of the component. Allow the temperature to hold for a period of fifteen (15) minutes after the temperature of the samples stabilizes at the temperature of the oven.
- 6.5 At the end of the fifteen (15) minutes, remove the samples from the oven and immediately immerse the samples into the 15 degrees C (59 degrees F) water. The water shall be agitated, by manual or mechanical stirring, constantly during the test to prevent any gradient heat problems.
- 6.6 When the temperature of the samples has cooled to the temperature of the water, remove the samples and inspect for visual defects such as breakage. A defect shall be defined as a crack, chip, break, flaw, fracture, warpage or crazing observed on the sample or assembly.
- 6.7 Perform for all four (4) samples. Samples may be tested individually or simultaneously.
- 6.8 Record all test results.

## 7.0 Test Data

7.1 Type of material being tested.

7.2 Description of the enclosure assembly in which the sample being tested is housed.

7.3 Sample Number.

7.4 Temperature of the water prior to immersing the sample.

7.5 Temperature of the sample in the oven.

7.6 Time the sample remained in the oven at the test temperature.

7.7 Results/Observations

## 8.0 Pass/Fail Criteria

All four samples shall show no defect or breakage as a result of this thermal-shock test.